

WHAT IS CLAIMED IS:

Katayama

1 A light-emitting device comprising:
a pair of electrodes formed on a substrate; and
5 organic compound layers comprising a light-emitting layer
provided in between the electrodes,

wherein at least one of the organic compound layers
comprises a heterocyclic compound having at least two hetero
atoms and a phosphorescent compound.

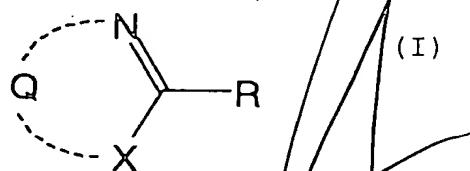
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2. The light-emitting device according to claim 1, wherein
the phosphorescent compound is an organic metal complex.

15 3. The light-emitting device according to claim 2, wherein
the organic metal complex is an ortho-metallated metal complex.

4. The light-emitting device according to claim 1, wherein
the heterocyclic compound is represented by formula (I):

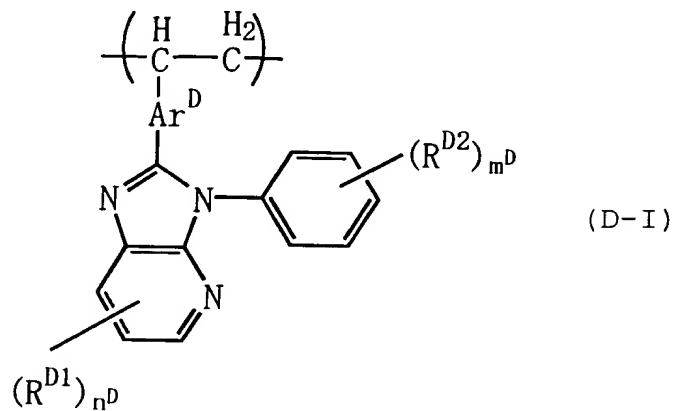
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wherein R represents a hydrogen atom or a substituent; X
represents $-O-$, $-S-$, $=N-$ or $=N-R^a$; R^a represents a hydrogen
25 atom, an aliphatic hydrocarbon group, an aryl group or a

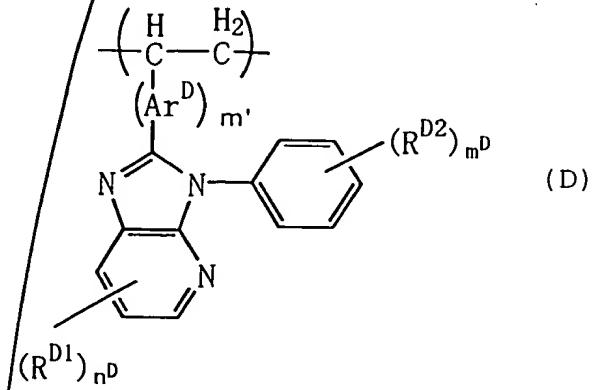
heterocyclic group; and Q represents an atomic group necessary for forming a hetero ring together with N and X.

5. A polymer comprising a repeating unit represented by formula (D-I):



wherein Ar^D represents an arylene group or a divalent heterocyclic group; R^{D1} and R^{D2} each independently represent a hydrogen atom or a substituent; n^D represents an integer of 0 to 3; and m^D represents an integer of 0 to 5.

6. The light-emitting device according to claim 1, wherein the heterocyclic compound is a polymer comprising a repeating unit represented by formula (D):

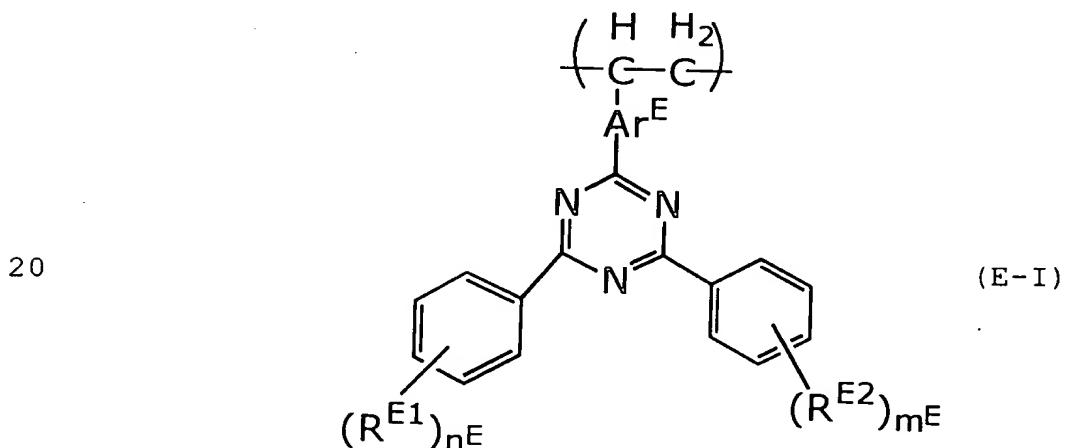


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wherein Ar^D represents an arylene group or a divalent heterocyclic group; R^{D1} and R^{D2} each independently represent a hydrogen atom or a substituent; n^D represents an integer of 0 to 3; m^D represents 5 an integer of 0 to 5; and m' represents 0 or 1.

7. The light-emitting device according to claim 6, wherein the substituent is a group selected from the group consisting of an alkyl group, an alkenyl group, an alkynyl group, an aryl group, an alkoxy group, an aryloxy group, an acyl group, a halogen atom, a cyano group, a heterocyclic group, and a silyl group.

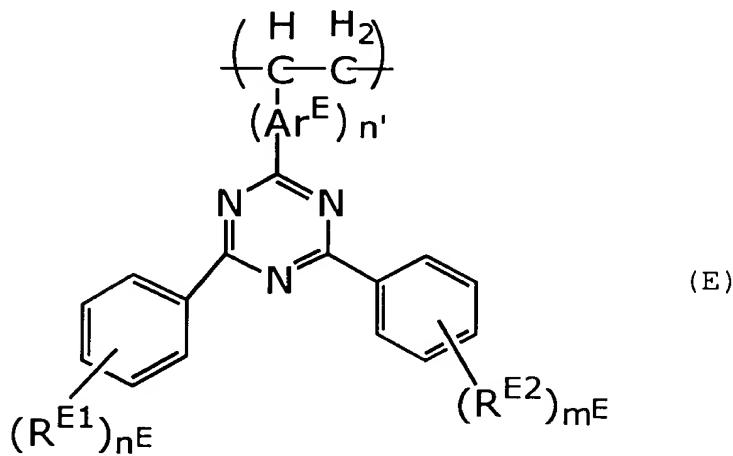
8. A polymer comprising a repeating unit represented
15 by formula (E-I):



wherein Ar^E represents an arylene group or a divalent heterocyclic group; R^{E1} and R^{E2} each independently represent a hydrogen atom

or a substituent; n^E and m^E each independently represent an integer of 0 to 5; and n' represents 0 or 1.

9. The light-emitting device according to claim 1, wherein
5 the heterocyclic compound is a polymer comprising a repeating unit represented by formula (E):



15 wherein Ar^E represents an arylene group or a divalent heterocyclic group; R^{E1} and R^{E2} each independently represent a hydrogen atom or a substituent; n^E and m^E each independently represent an integer of 0 to 5; and n' represents 0 or 1.

20 10. The light-emitting device according to claim 9,
wherein the substituent is a group selected from the group consisting of an alkyl group, an alkenyl group, an alkynyl group, an aryl group, an alkoxy group, an aryloxy group, an acyl group, a halogen atom, a cyano group, a heterocyclic group,
25 and a silyl group.

11. The light-emitting device according to claim 3,
wherein the ortho-metallated metal complex is an iridium complex.

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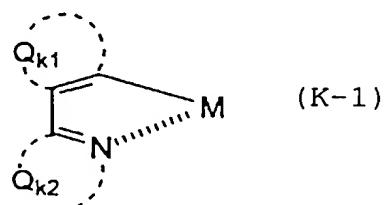
12. The light-emitting device according to claim 1,
wherein the organic compound layers comprise a polymer.

13. The light-emitting device according to claim 1,
10 wherein the phosphorescent compound has a phosphorescence
quantum yield at room temperature of at least 25%.

14. The light-emitting device according to claim 3,
wherein the ortho-metallated metal complex contains 5 to 100
15 carbon atoms.

15. The light-emitting device according to claim 3,
wherein the ortho-metallated metal complex is a compound having
a partial structure represented by formula (K-1):

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wherein M represents a transition metal; Q_{k1} represents an atomic
25 group necessary for forming a 5- or 6-membered aromatic ring;

and Q_{k2} represents an atomic group necessary for forming a 5- or 6-membered aromatic azole ring;

or tautomer of the compound.

A handwritten signature in black ink that reads "G. Wall". Above the "G", the number "5" is written. Below the "l", the number "3" is written. The signature is written in a cursive style with a thick black line.